

# BACKGROUND

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## RENEWABLE ENERGY POISED TO BROADEN ITS REACH, SPECIALIST SAYS

### Expansion driven by declining costs, concerns over oil supply, climate

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(begin byliner)

Renewables: Looking Toward Inexhaustible Energy

By Michael Eckhart, President, the American Council on Renewable Energy.

Note: ACORE staff members Peter Gage and Cameron McCarter contributed to this article.

The renewable energy sector is about to turn a corner. Commercially available and economically competitive in many locations, renewables will further U.S. national interests by helping end our addiction to oil and begin to address the issue of global warming. The industry is poised for Phase II, putting America's 30-year, \$15 billion investment in research, development, and demonstration of renewable energy technologies to use in the marketplace.

#### Market Drivers

There are three key drivers pulling markets toward renewables. The first is national energy security. Current projections show U.S. oil consumption increasing and outpacing flat domestic production curves, leaving the United States increasingly dependent on foreign oil markets. This would make the U.S. economy vulnerable to disruption in oil imports.

Additionally, the rapid growth of developing countries such as China and India places an increasing strain on world oil markets, a problem that is likely to get worse over time. The effects of this can already be seen: The price of oil has surpassed \$70 per barrel in mid-June 2006, up from \$30 only a few years ago. Renewable energy can

help the United States rely on domestic sources of energy, which will reduce our need for oil or lessen the growth of our consumption.

A second driver toward renewable energy is concern about climate change. Renewable energy can help provide for our energy requirements while decreasing our greenhouse gas emissions. According to several news sources, more than 2,000 scientists have concurred that greenhouse gases such as carbon dioxide and methane are building up in the Earth's thin atmosphere and that this buildup of gases is increasing global temperatures. Many of these scientists believe that this increase of temperatures portends negative and potentially catastrophic consequences, that the time frame for addressing the issue is now, and that there are actions that can be taken. Use of carbon-free renewable energy is one of them.

A third market driver is the cost of renewable energy, which has been decreasing for decades and is projected to continue to decrease for some renewables. The decreasing costs of renewable energies can be attributed to improvements in the technologies of the renewables. As the industry matures, costs will continue to decrease.

#### Putting Renewable Energy to Use

The uneven distribution of renewable energy resources across the United States makes it difficult to have a single, sweeping national policy. Solar energy is strongest in the Southwest; wind power is most-used in the Great Plains, on mountain ridges, and offshore; and geothermal energy is available in the West. Biomass is available across the country, but regionally in different forms. Biofuels are being produced in the farming states but consumed in cities that have air quality restrictions.

There are a thousand local markets for renewable energy across America, each with unique resources, economics, culture, and politics. Individual states have taken the lead in the renewable sector. Nearly half of the states employ a renewable portfolio standard (RPS) -- a system of goals for producing renewable energy. The employment of RPSs at the state level requires utilities to provide a particular amount of energy from renewable sources by a specific date, thus creating new demand for renewable energy immediately.

Elsewhere, the European Union has taken steps toward promoting renewable energy use and is a source of policy innovation. Germany, Spain, Italy, and others have implemented feed-in tariffs, which is the price per unit of electricity that a utility or supplier has to pay for renewable electricity from private generators. Meanwhile, Finland, Greece, and the United Kingdom have grants, tax incentives, and mandates for people to produce or use green power.

There have been widespread efforts to deploy renewable energy in the developing countries, with funding by the U.S. Agency for International Development and many

donor agencies, and with financing support by the World Bank, European and other regional development banks, and the private sector. India was one of the first to commit to broad-based use of renewables and is active in wind, solar, hydro, and biomass energy. Brazil has been the early leader in sugar-based ethanol. Southern India, Sri Lanka, and Bangladesh have developed markets for the use of solar photovoltaics (PV), getting initial electricity to off-grid homes. China has developed a \$3-billion-per-year solar water heating industry.

#### Wind Power

Wind power is the leader in wholesale renewable electricity production in the United States. Total installed U.S. wind power capacity was 9,149 megawatts at the beginning of 2006, according to the American Wind Energy Association. A large part of this -- 2,420 megawatts -- was installed in 2005, and an estimated 3,000 megawatts is planned for installation in 2006. With recent technological advances, the price competitiveness of wind generation versus natural gas has improved, supporting continued growth. In addition, the U.S. federal government offers companies a production tax credit for wind power equal to about 1.9 cents per watt-hour. This has been a powerful incentive to attract tax-oriented investors, such as utility companies, into wind farm ownership.

The original markets for wind power were Denmark in the late 1990s, followed by Germany. Today, the hot markets are Spain, Italy, France, the United Kingdom, and India. But wind power is available almost everywhere.

#### Solar Energy

Solar PV, a \$12 billion global industry, is the leading renewable power source for distributed power generation (consumers who generate heat or electricity for their own needs and send surplus electrical power back to utilities), with recent growth in Japan, Germany, and Spain.

In 2005, the U.S. Energy Policy Act established a 30-percent federal tax credit for solar systems purchased for both residential and business applications in the United States, on top of substantial subsidy programs in states such as California and New Jersey.

In the developing countries, PV has great opportunity but has proven difficult to implement because it requires a local infrastructure of companies to sell, install, and service the equipment, and needs financing, which often is not available. Yet, markets are growing in India, Sri Lanka, Bangladesh, Morocco, Kenya, South Africa, and elsewhere.

#### Biofuels

Biofuels, principally maize-based ethanol, present the biggest investment opportunity in renewable energy in the United States for the next several years. Recent evidence assembled by Lawrence Berkeley Laboratory rebuts outdated beliefs from the 1970s that, because of the energy-intensive production, environmental benefits from maize-based ethanol are non-existent. It now appears that producing maize-based ethanol requires much less petroleum than producing gasoline and that greenhouse gas emissions from such an ethanol are about 15 percent to 20 percent lower than from gasoline. New cellulosic ethanol technology reduces both greenhouse gas emissions and petroleum inputs even more substantially. With ethanol replacing methyl tertiary-butyl ether (a chemical compound used as a fuel component in gasoline that has been banned in 22 states), demand has grown rapidly. In 2006, more than 4.7 billion gallons (17.9 billion liters) of ethanol will be produced, and there are 2 billion gallons (7.6 billion liters) per year of new processing capacity under construction in the United States.

The U.S. auto manufacturers have taken notice of the recent interest in biofuels. General Motors, for example, currently produces nine models that can run on E85, a mixture of 85 percent ethanol and 15 percent gasoline.

#### Investment

Large investments are being made in renewable energy companies and projects. Venture capitalists invested close to \$181 million in alternative energy companies in 2005, an increase of \$78 million from the previous year, according to PricewaterhouseCoopers, Thomson Venture Economics, and the National Venture Capital Association.

Major industry leaders have begun to take notice of this growing market opportunity and are showing their support. For example, General Electric recently invested \$51 million in a 50-megawatt wind project in California, and Cascade Investment LLC placed \$84 million into Pacific Ethanol, which produces and markets renewable fuels. The accelerated market growth has created a favorable environment for investors, with opportunities for substantial profits, as well as risks, in this now \$50-billion-a-year industry.

#### National and Global Benefits

Renewable energy is a broad category of sources that draws from the naturally available energy around us. While not a silver bullet, the more we use it, the better off we will be in terms of reducing oil imports, reducing pollution and greenhouse gas emissions, and increasing jobs.

Renewable energy can provide significant opportunities for developing countries and rural areas. For example, by providing new jobs and new sources of income for farmers and ranchers, the Colorado Green Wind Farm in Lamar, Colorado, boosted

the local county tax base by 29 percent, increased the school general fund by \$917,000 per year, and increased funding of the county medical center by \$189,000.

The potential of renewable energy is vast. It contributes to America's needs for security of supply, a cleaner environment, good jobs, and investment opportunities. The rural sector of America stands to receive the most benefits from renewable energy development.

Such development also offers opportunity to the rural people of the world everywhere to gain access to modern forms of energy. Wind, solar, geothermal, biomass, and small hydro plants can generate electricity for rural utilities and villages. Solar PV and solar water heating can bring modern energy to homes.

#### Outlook

The outlook for renewable energy in the United States and around the world is positive and accelerating. This is a challenge for government policy planners who have to rely on computer modeling projections that can be out of date because oil prices have increased rapidly and demand for renewable energy has accelerated. For example, while the official U.S. forecast from the Energy Information Agency shows renewable energy contributing only about 10 percent of U.S. energy supply in 2030, various industry groups are more optimistic. The Energy Future Coalition is calling for 25 percent by 2025, and ACORE sees the potential for 20 percent, 30 percent, and 40 percent by 2020, 2030, and 2040, respectively.

To make this happen, conventional energy prices must continue to stay high, renewable energy costs must continue to come down, and government policies must be stable and predictable to encourage commitment of lenders and investors to the financing of renewable energy systems. There also must be international collaboration to transfer the technologies to the developing countries.

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